DFA Problem Set

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DFA Problem Set: To Do

- For each problem, write the 5-tuple formal representation and draw the DFA or State Transition Diagram.

- Tool: http://madebyevan.com/fsm/

- Right Click and Save Image as PNG in the tool itself to save your diagrams.

- For real time systems like washing machine, **include pictures* or video samples*** wherever possible.

- **Submit your solutions as a markdown file in GitHub and give a PullRequest**

- **Git Repository: https://github.com/RootLearning/DFA-Problem-Set**

- ***Warning: Don't take a photo or video of ATM machines, as you may end up in trouble or jail.**

Regular Expressions

Create DFA for (ab*) including Empty String - Exercise

Create DFA for (aa)* including Empty String - Exercise

Create DFA for (ab)* including Empty String - Exercise

Create DFA for (a*b*) - Exercise

Create DFA for (a⁺b*c) - Exercise

Create DFA for (a*b+c*) - Exercise

Create a DFA to Validate Username

Username can contain "a-z", "A-Z", "0-9", "_", "." only.

Create a DFA to Validate Password

Password must be of length 7 or more. Must contain at least one of each of the following: "a-z", "A-Z", "0-9", Symbols:"!,@,#,$,%,^,&,*,(,)".

Create a DFA to Validate Simple Email ID

Email ID contains two parts: Name and Domain separated by @. For Name follow the same rules to be followed for **Username**. For Domain, the regular expression is: $(a-z)^+.(a-z)^+ \{2-4\}$.

Means it ends with a 2, 3 or 4 character domain. E.g. .com, .in, etc.

System Design

Create DFA: Exercise Problems

- **Coin based Weighing Scale:** Get Weight – 2 Rupees and input denomination is {1, 2}

- **Vending Machine with 5 Star:** 5 Rupees, 10 Rupees and 20 Rupees Chocolates and input denomination is {5, 10, 20}

- **Coffee Machine with Four Different Drinks:** Tea – 10 Rupees, Coffee – 15 Rupees, Green Tea – 20 Rupees, Hot Chocolate – 30 Rupees and input denomination is {5, 10, 20}

- **Design a Coin Pay Phone:** 1 Rupee per minute. Input {1}. Can **extend** a call by adding another coin **during a phone call.**

Create DFA: Exercise Problems

- **Design an Elevator Control with Two Buttons (Up and Down) for a Building with 4 Floors.**

- **Design an Auto Cut-off Fuel Filling Machine with Fuel/Price input.**

- **Washing Machine with Predefined Washing/Drying Programs**

- **ATM Cash Withdrawal, Cash Deposit, Check Balance, Change PIN, Print Mini Statement, and Fund Transfer.**

Create DFA: Games

- Number Guessing Game

- Rock Paper Scissors

- Tic Tac Toe

- Mastermind

- Blackjack

- Battleship

- Connect4

Thank You